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~~UNCLASSIFIED~~ INFORMATION ON SOVIET
BLOC INTERNATIONAL GEOPHYSICAL COOPERATION
-1960

1 OF 1

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INTERNATIONAL GEOPHYSICAL COOPERATION PROGRAM --

SOVIET-BLOC ACTIVITIES

<u>Table of Contents</u>	<u>Page</u>
I. GENERAL	1
II. ROCKETS AND ARTIFICIAL EARTH SATELLITES	2
III. UPPER ATMOSPHERE	3
IV. METEOROLOGY	6
V. GEOMAGNETISM	7
VI. GRAVIMETRY	8
VII. OCEANOGRAPHY	8
VIII. GLACIOLOGY	9

I. GENERAL

Soviet Geophysicists Awarded Lenin Prize

The 90th birthday of V. I. Lenin has been commemorated by the award of the Lenin Prize to a number of Soviet scientists; several workers in the geophysical sciences received the coveted award:

S. N. Vernov, Corresponding Member of the Academy of Sciences of the USSR; A. Ye. Chudakov, Doctor of Physical-Mathematical Sciences; N. V. Pushkov and Sh. Sh. Dolginov -- for the discovery and investigation of the Earth's outer radiation belt and investigation of the magnetic fields of the Earth and Moon.

Vernov and Chudakov discovered the presence of an outer radiation belt around the Earth consisting of electrons with an energy on the order of 100 kev -- decreasing in altitude in the high latitudes to a distance of several hundred kilometers above the Earth's surface. They established a general picture of the distribution of charged particles in space near our planet and at great distances from it.

N. V. Pushkov and Sh. Sh. Dolginov created new types of magnetic instruments, made measurements of magnetic fields in the Earth's outer radiation belt, and demonstrated the presence of extra-ionospheric electrical currents.

A. Ye. Kriss, an oceanographer, is still another recipient of a Lenin Prize. He has laid the basis for a new branch of science -- oceanic microbiology. Kriss, who holds a doctorate in biological science, is the author of "Marine Microbiology (Deep-Water)." This monograph is the result of many years of research in the interior seas and on the oceans. By the use of new methods the author has succeeded in describing the little-known microflora of the seas and oceans, has discovered a new class of microorganisms, has expanded our understanding of the microbiological processes of conversion of organic and inorganic compounds in the depths of the seas and oceans, and has studied the influence of the high pressures of oceanic depths on the life of microorganisms. ("Scientists of the Academy of Sciences of the USSR -- Recipients of the Lenin Prize," Vestnik Akademii Nauk SSSR, No. 6, 1960, pages 48-51)

II. ROCKETS AND ARTIFICIAL EARTH SATELLITES

Soviet Spaceship Continues In Orbit; Radio Contact Broken

The following is the full text of a dispatch appearing in Pravda on 9 July:

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The Soviet spaceship launched on 15 May of this year had completed 838 revolutions around the Earth at 1800 hours Moscow time on 8 July.

During this same time the rocket-carrier completed 869 revolutions.

The "Signal" radio transmitter aboard the spaceship is no longer functioning due to the exhaustion of its electric power sources.

Observations of the motion of the spaceship are being continued by optical means.

On 9 July the spaceship may be observed visually in the evening after sunset from 35° to 46° N. and in the morning before sunrise from 56° to 65° S.

The last stage of the rocket-carrier may be observed visually in the evening after sunset from 27° to 38° N. and in the morning before sunrise from 50° to 58° S. ("Motion of the Soviet Cosmic Spaceship," Pravda, 9 July 1960, page 4)

CPYRGHT

Later Report on the Soviet Spaceship -- Rocket-Carrier Makes its Last Revolution Around the Earth

The following is the full text of an Izvestiya article of 21 July:

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The Soviet spaceship completed its 1,006th revolution around the Earth on 18 July at 1800 hours.

The last stage of the rocket-carrier on the 17th of this month made its 1,019th revolution around the Earth; it then entered the dense layers of the atmosphere and ceased to exist.

CPYRGHT

Observations of the motion of the spaceship and the airtight cabin are continuing; the cabin is lagging behind the spaceship by approximately 56 minutes. ("Spaceship in Flight," Izvestiya, 21 July 1960, page 6)

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Mirror-Lens Objective for Photographing Artificial Earth Satellites

Data on the dimensions and the main optical characteristic of a high-speed mirror-lens objective are given in an article by N. V. Yakovlev, of the Moscow Institute of Engineers of Geodesy, Aerial Photography and Cartography, in Astronomicheskii Zhurnal, Vol 37, No. 3, 1960. The objective described by Yakovlev permits the photography of artificial earth satellites of the sixth magnitude on a film with a sensitivity of

about 500 $\frac{1}{\text{lux X sec}}$. (Use of Mirror-Lens Objectives for Photographing

Artificial Earth Satellites, by N. V. Yakovlev; Moscow, Astronomicheskii Zhurnal, Vol 37, No. 3, May-June 1960, pages 550-554)

III. UPPER ATMOSPHERE

Important Improvements in the Physical Plant of the Crimean Astrophysical Observatory

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Nauchnyy (Science) Village, Crimean Oblast, 15 June (by telephone from the Izvestiya correspondent). The silvery cupolas of the Crimean Astrophysical Observatory of the Academy of Sciences of the USSR rise in a picturesque corner of mountainous Crimea at an elevation of about 600 meters above sea level. Alongside them has grown up a small settlement with the residential blocks occupied by the homes of astronomers.

The construction of still another new tower with a height as great as a nine-story building has now been completed at the Crimean Astrophysical Observatory. The inner diameter of its cupola is 20 meters. The structure will house one of Europe's largest parabolic reflecting telescopes with a mirror having a diameter of 260 cm.

The equipment for the giant new telescope was manufactured in Soviet enterprises. Its creation is due to the work of various factories in Leningrad -- optical, mechanical, metal-fabricating, hoisting and handling equipment, etc.

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The installation of the equipment of the new telescope has now begun at the observatory. ("Giant Telescope," Izvestiya, 16 July 1960, page 6)

Search Begins for Far Eastern Meteorite

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Khabarovsk, 7 July (by telephone from the Izvestiya correspondent). A fire-ball swept across the evening sky, and after leaving a luminous trail behind it, fell into the mountains of the Dzhugdzhuraskiy Range. A powerful explosion was heard, rolling with a hollow echo. So it was on 22 December of last year when a large meteorite -- still another "letter" from space -- fell in Khabarovsk kray.

The Committee on Meteorites of the Academy of Sciences of the USSR delegated V. A. Yarmolyuk, Chief of the Far Eastern Geological Administration, to collect basic data on the celestial "guest." He established that the falling of the meteorite was observed by more than a hundred inhabitants along the coast of the Sea of Okhotsk and in the mountain taiga settlements of the Dzhugdzhuraskiy Range.

Investigation of the meteorite has begun. The researchers are faced with great difficulties which they must overcome; they must travel through a region where there are many high and steep cliffs and many turbulent rivers.

The correspondent of Izvestiya has asked the chief of the expedition, Comrade Moralev, to tell about the progress of the work. Here is what he reported by telegraph from the village of Chagda in the Yakut ASSR:

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The search for the meteorite will be made by two teams which include experienced geologists. The first team left for the work area on 15 June and undertook the search in the inaccessible mountains and taiga of the Dzhugdzhurskiy Range. We are keeping in regular radio contact with it. The second team is awaiting a plane to take them to the work area." ("Letter From Space," Izvestiya, 8 July 1960, page 5)

CPYRGHT

New Instrument Devised for the Comparison of Astronomical Negatives

D. A. Rozhkovskiy, section chief of the Astrophysical Institute of the Academy of Sciences of the Kazakh SSR, has constructed an instrument for the examination and comparison of astronomical negatives. This instrument combines various principles for the comparison of images, including color contrast. The new instrument is at the same time a stereocomparator, a blink microscope, a comparison microscope, and a color contrast microscope.

With the development of this instrument it has become possible to make some measurements of a new asteroid discovered by E. Denisjuk in 1957 during an attempt to photograph the asteroid YeB No. 1949 in the constellation Capricorn. Photographs were made at the Institute's mountain astrophysical observatory, but they proved to be extremely faint. Therefore it was not possible to make the necessary comparisons and measurements on the instruments existing at that time.

The instrument devised by D. A. Rozhkovskiy has a special device for finding new objects in the night sky by a method that has never been used before. Special filters intercept the ray of light as it passes from the instrument onto two photographic plates and breaks the images down into different colors: ordinary stars become black and new objects appear in a red or blue color.

This universal comparator will undoubtedly find extensive application in astrophysical observations. At the present time the Astrophysical Observatory has begun the processing of the new data and is making ready for the observation of the newly discovered asteroid in its closest opposition. ("Original Astronomical Instrument," Vestnik Akademii Nauk SSSR, No. 6, 1960, page 101)

New Article Confirms Earlier Reports on Yarymlinskiy Meteorite

Another article dealing with the meteorite which fell in the Azerbaydzhan SSR on 24 November 1959 has now appeared in Soviet scientific literature.

This article has little to add to previously published reports. As in most recent articles on the subject of meteorites it stresses the importance of their study in an age when Man is about to make his first flight into space.

After mentioning that fragments of this meteorite have been sent to scientists in other countries for their study, the article concludes by reiterating that this is the first attempt at international cooperation in the study of a single meteorite. ("Yardymlynskiy Meteorite," by Ye. L. Krinov, Vestnik Akademii Nauk SSSR, No. 6, 1960, pages 132-134)

Study on the Expansion of a Sodium Cloud in Interstellar Space

The problem of the expansion of gas in a vacuum is studied experimentally (from observations of a sodium cloud) and theoretically in an article by S. A. Kaplan and V. G. Kurt which appears in the latest issue of Astronomicheskii Zhurnal. It is shown that the expansion can be divided into two stages: adiabatic expansion and free expansion. During the first stage the temperature drops by 350-600 degrees, in the second, the atoms maintain their thermal velocities. Formulas were obtained which connect the velocity of adiabatic expansion (a) and the thermal velocity of the second stage (c_k), for the density distribution, and for surface brightness.

The reduction of observational data showed good agreement with theory and permitted determination of the velocities $a = 1.40$ km/sec and $c_k = 0.87$ km/sec. The results are only very slightly sensitive to the selected model of initial distribution. At this stage the case of spherical expansion is in somewhat better agreement with observations. The assumption that the adiabatic stage is totally absent is in sharp contradiction with observational data. (The Expansion of a Sodium Cloud in Interplanetary Space, by S. A. Kaplan and V. G. Kurt; Moscow, Astronomicheskii Zhurnal, Vol 37, No 2, May-June 1960, pages 536-542)

IV. METEOROLOGY

New Acoustic Anemometer Developed in the USSR

The measurement of wind velocity by sonic means has been attracting attention in the USSR and abroad during the last decade but it has been limited for the most part to experimental use. The reason for this has been the complexity of the electronic equipment necessary for its operation. Some progress has now been made in making this method available for use on a broader basis. This article describes an acoustic anemometer that has numerous advantages in comparison with previous instruments of this type. It is designed for the investigation of turbulence in the near-surface layers of the atmosphere; it was used successfully in 1958 on an expedition of the Institute of Physics of the Atmosphere of the Academy of Sciences of the USSR. ("Acoustic Anemometer," by V. M. Bovsh-everov and V. P. Voronov, *Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya*, No. 6, 1960, pages 882-885)

A New Method for the Analysis of the Kinetic Energy of Atmospheric Movements

G. V. Gruza of the Central Asiatic Hydrometeorological Scientific Research Institute is the author of a recently appearing article on the kinetic energy of atmospheric movements. This article provides the methods and formulae used for deriving the results of the research. The two years 1953 and 1956 are used for comparative purposes. ("On the Kinetic Energy of Atmospheric Movements," by G. V. Gruza, *Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya*, No. 6, 1960, pages 892-897)

The Diffusion of Silver Iodide Vapor in an Enclosed Container

The authors, cognizant of the importance of silver iodide research, initiated a study of the diffusion of silver iodide vapor in a cylindrical chamber 13m³ in size at temperatures in the range from +20° to -10°. The results of this experiment are summed up in a brief 3-page article. ("The Study of the Diffusion of Silver Iodide Vapor in an Enclosed Container," by T. N. Zhigalovskaya and V. N. Balabanova, *Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya*, No. 6, 1960, pages 903-905)

V. GEOMAGNETISM

New Study Analyzes Short-Period Variations of the Geomagnetic Field

A recent article describes some of the systematic features in the behavior of the vertical component of short-period variations (KPK) of the geomagnetic field as observed by geophysical stations of the Institute of Physics of the Earth of the Academy of Sciences of the USSR in the first six months of the IGY. The article examines the frequency spectrum of the KPK field, the diurnal pattern of the number of cases of appearance of KPK, the diurnal pattern of the mean maximum amplitude of KPK and their behavior in dependence on the geographical distribution of observation points. To help understand the general amplitude characteristics the concept of "Pc activity" is introduced and its behavior is examined.

The authors draw the following conclusions:

1. The KPK spectrum in the 10 to 90 second range is discrete; the manifestation of variations of different periods is not equally probable.
 2. In accordance with the diurnal pattern of the number of cases of manifestation of KPK of different periods the spectrum is subdivided into groups of 20-30 and 60-90 seconds, controlled by local time and a group of 40 seconds, controlled by universal time.
 3. The diurnal pattern of mean maximum amplitude of KPK of the different periods is subject to a general regularity and is controlled by local time.
 4. The group of variations with periods from 60 to 90 seconds at the station "Borok" is similar in its characteristics to variations of the Pc-type.
 5. Pc activity, evaluated on a three-category scale, makes it possible to compare regularities in the behavior of Pc-type short-period variations which have considerably different amplitudes at different stations. Pc activity possesses a clearly expressed diurnal march with a maximum at about noonday, transpires on local time, has a seasonal march, and reveals a tendency to a latitudinal displacement (that is, the maximum Pc activity sets in earlier at the stations at higher latitudes).
 6. Disturbances with a period of less than 50 seconds should be subdivided into PcA proper and disturbances of this same period arising in the absence of stable variations of a given period (the latter are especially characteristic of polar stations).
- ("Some Regularities in the Behavior of the Vertical Component of Short-Period Variations in a Geomagnetic Field with a Stable Regime (Pc)," by O. V. Bol'shakova, K. Yu. Zybin, and N. F. Mal'tseva, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 6, June 1960, pages 818-827)

VI. GRAVIMETRY

Earth Tides and the Internal Structure of the Earth

N. N. Pariyskiy, Doctor of Physical-Mathematical Sciences, is the author of a significant 3,000 word paper on the subject of earth tides that has recently appeared in the Vestnik of the Academy of Sciences of the USSR. It represents an important contribution to the limited literature on this subject and is recommended for full translation for persons engaged in research on earth tides. ("Earth Tides and the Internal Structure of the Earth," by N. N. Pariyskiy, Vestnik Akademii Nauk SSSR, No. 6, 1960, pages 61-69)

VII. OCEANOGRAPHY

New Section Established in the Oceanographic Commission

A section on underwater research is a constituent part of the Oceanographic Commission of the Academy of Sciences of the USSR. The deputy chairman of this section, V. G. Azhazha, has told the correspondent of "Nedelya" about the plans of the section. Here is what Azhazha had to say:

"Up to the present time the seas and oceans have been studied very little and we therefore do not know of all their wealth and possibilities. The time has come when an 'attack on the sea' requires the united efforts of all the scientific institutions of our country that are engaged in submarine oceanographic research."

"The newly established section will become such a united coordinating-methodical center dedicated to the solution of myriad interesting problems. The most important of these is the working out of plans for the preparation and conduct of major submarine expeditions and the generalization of the experience of underwater research in the USSR and abroad."

"In addition, the section should make possible the establishment in our country of a complete arsenal of [underwater] research equipment, ranging from equipment for scientific researchers using aqualungs to the most complex of deep-water apparatus -- bathyscaves. The status of [underwater] television, photography, movies and other methods facilitating the work of the scientist beneath the surface of the sea should also be within the purview of this new organ of the Oceanographic Commission. In a manner similar to rare book libraries the section's film and photo library will collect unique movie and photo documents which will reveal to the public the unknown world beneath the surface of the sea."

"The section on underwater research has begun its work. A staff has been selected which is headed by Professor Boris Petrovich Manteyfel', one of the most experienced leaders of marine expeditions. The first

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plenary session of the section is planned for fall; by then much underwater research with the aqualung will be completed, observations from the diving bell now operating in the Barents Sea will be terminated, and the submarine 'Severyanka' will have returned from its current voyage."

"The banner of research has been hoisted!"

("The Banner of Research Has Been Hoisted," Nedelya, No. 20, 10-16 CPYRGHT July 1960, page 2)

VIII. GLACIOLOGY

"Glaciology of Tuyuksu Glacier in the Tien-Shan Mountains"

A six-page article recently appearing in an East German geodetics and cartographic periodical reports on the participation of East German scientists in a Soviet expedition to Kazakhstan in 1958 for the purpose of conducting research on the Tuyuksu glacier complex in the Tien-Shan Mountains south of Alma Ata. The German scientists performed four of the ten research points of the expedition: study of the glacier-atmospheric heat balance with respect to thawing; hydrometric study of the role of glacial water in feeding the rivers; mapping, and study of the speed of the glacier by photogrammetric methods. The authors are Engineers M. Simon and H. Hartmann, of the Cottbus College of Architecture. ("In the Tien-Shan Mountains," by M. Simon and H. Hartmann, Vermessungstechnik, No 6, June 1960, pages 153-158)

"Photogrammetric Problems and Operations of the Expedition to the 'Tuyuksu' Glacier Region (Tien-Shan)"

A four-page article by Engineer J. Toppler, of the Dresden Polytechnical University, presents the problems and operations of the photogrammetric work which served as the basis for the trigonometric computations of Engineers M. Simon and H. Hartmann in processing the data of the expedition to the "Tuyuksu" glacier region of the Malaya Alma Atinka headwater area. ("Photogrammetric Problems and Operations of the Expedition to the 'Tuyuksu' Glacier Region (Tien-Shan)," by Engineer J. Toppler, Vermessungstechnik, No 6, June 1960, pages 159-162)

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